

Porting a Hall MHD code to a Graphics Processing Unit

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We present our experience porting a Hall MHD code to a Graphics Processing Unit (GPU). The code is a 2nd order accurate MUSCL-Hancock scheme which makes use of an HLL Riemann solver to compute numerical fluxes and second-order finite differences to compute the Hall contribution to the electric field. The divergence of the magnetic field is controlled with Dedner's hyperbolic divergence cleaning method. Preliminary benchmark tests indicate a speedup (relative to a single Nehalem core) of 58x for a double precision calculation. We discuss scaling issues which arise when distributing work across multiple GPUs in a CPU-GPU cluster.